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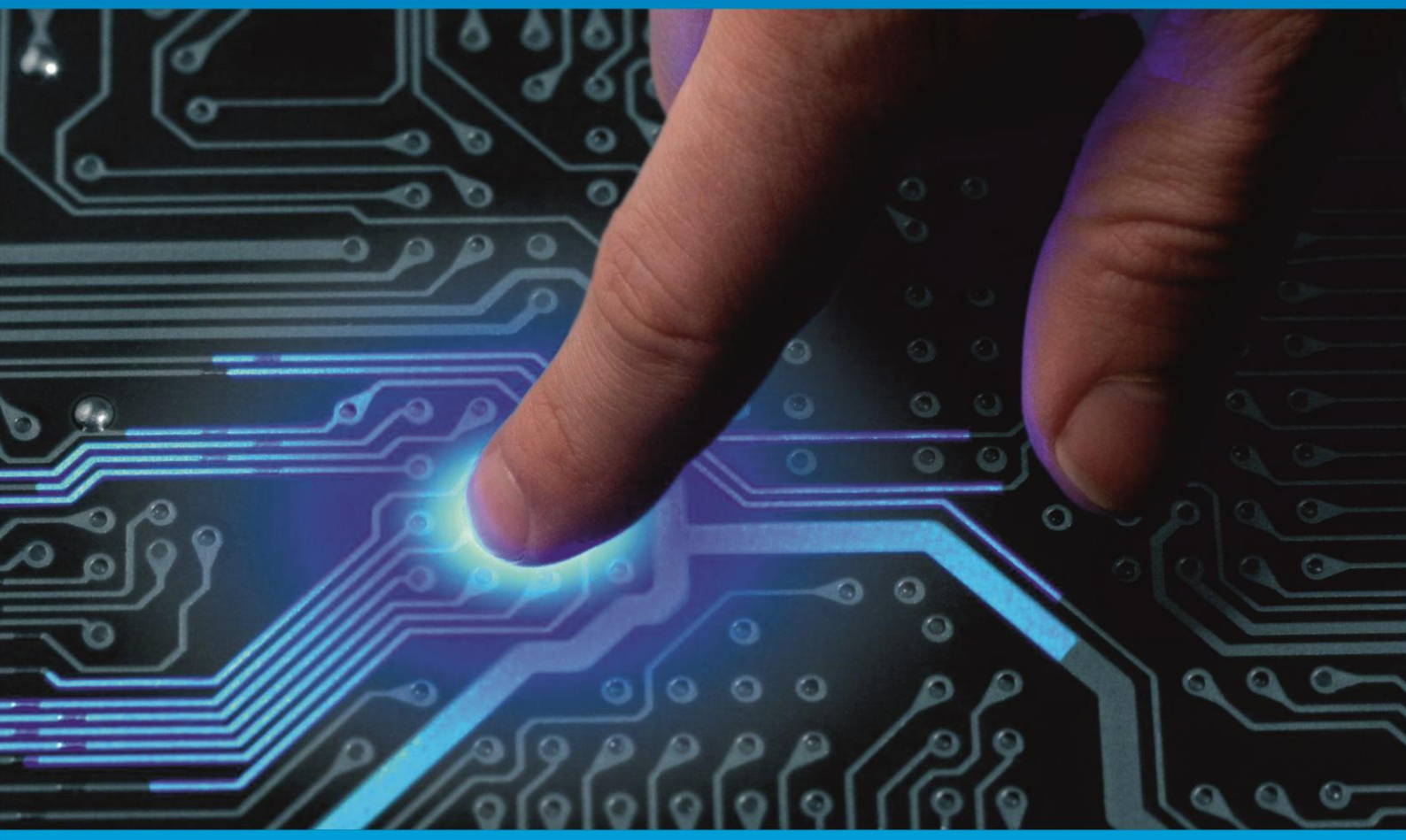

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Driver Drowsiness Detection System OpenCV and Raspberry Pi

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ABSTRACT: This approach for detecting drowsy drivers was developed using a computer's visionbased reasoning pro cessThe camera, which serves as the system's starting point, feeds a live image of the driver to a structure that focuses it directly on his or her face and checks the driver's eyes with the specific goal of detecting sleepiness.When drowsiness i s detected via live video analysis, a driver alert is given in those situations. The framework advances programme contro l by leveraging data from the image to locate facial tourist spots, which enables the system to determine where an indivi dual's eyes are located. The suggested framework deduces that a driver is feeling sleepy and raises an alarm for safety if their eyes are closed for a predeterminedperiod of time. Once a face is identified and the eyes are located, the system b egins to function.

KEYWORDS: Driver drowsiness; eye detection; yawn detection; blink pattern; fatigue.

I. INTRODUCTION

About a million fatalities a year are caused by drowsy driving.As per the National Safety Council, there have been 71,0 00 injuries and 1,550 fatalities (NSC). According to AAA, drowsy driving is a factor in 9.5% of all collisions.A automo bile safety system called driver drowsiness detection forgoes accidents by alerting the driver when they are about to fall asleep.A significant problem in the realm of accident avoidance systems is the creation of technology that can detect or stop tiredness at the wheel. It is necessary to create strategies for reducing the effects of drowsiness because of the danger it poses while driving. Driver fatigue and distractions can both lead to driver inattention, which can lead to a lack of alertness when driving. When something or someone diverts someone's focus from the task of driving, driver distraction occurs. Driver drowsiness, in contrast to diver distraction, has a trigger and is instead characterised by a gradual loss of focus on the road and traffic needs. However, both driver fatigue and distraction may have the same negative impacts, including slowed reaction times, poorer driving performance, and a higher risk of being involved in a crash.

II. LITERATURE SURVEY

[2] In particular, this study will explore alterations in eyesight and facial features as indicators of drowsy driving. This research will also discuss difficulties in collecting features of sleepiness-related natural gestures, driver behaviour, and task environment. Additional technical considerations include accurately recording face and eye characteristics from unwanted motions, inappropriate work conditions, technology constraints, and individual variances. In [3] author has come up with a strategy for waking up sleepy drivers while they are on the road. Driver sleepiness is one of the factors that contributes to auto accidents. As a result, this study made an experiment to measure the degree of drowsiness in an effort to remedy the problem. Utilizing a Raspberry Pi Camera and Raspberry Pi 3 module, which could estimate drivers' levels of tiredness, was a necessity for this work. The frequency of eye blinking and head tilting was employed to gauge a driver's level of drowsiness. The accuracy of face and eye detection went up to 99.59 percent in a test with ten volunteers. In [4] In this study, a buzzer-based real-time video-based image processingsystem is presented to gauge drivers' levels of intoxication. A YCbCr colour modelbased filter finds faces. For the purpose of detecting drowsiness, the landmarks of the face are recognised, and the six landmark points of the each eye are analysed using the Relative Areal Ratio (RAR). The suggested solution is examined using a Raspberry Pi under different lighting conditions, and the response of the system is examined to guarantee a prompt alarm.[5] Suggests a vital smartphone application for saving lives: a mobile tiredness detection system. In order to support fast response times given a low-power CPU in comparing with a desktop computer, mobile detection systems must I accept relatively low-resolution images for image recognition; (ii) support fast response times; and (iii) demand high prediction accuracy from lightweight machine

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learning algorithms because the software programmes embedded in smartphones are resource-constrained. In this article, solutions for indoor facial profiling systems that primarily rely on the progressive locating technique for eye detection are discussed. We report acceptable experimental findings for eye detection rate and driver drowsiness detection in various scenarios.[6]tries to identify the onset of exhaustion in individuals, etc., in order to identify a particular disease that exhibits fatigue as a symptom.A system for fatigue detection is suggested in this paper. Using computer vision, our system will operate. The person's facial emotions catch our attention the most. In our system, there will be five stages: Face detection, facial landmark detection, feature extraction, eye closure status, and lip opening status.

III. METHODOLOGY

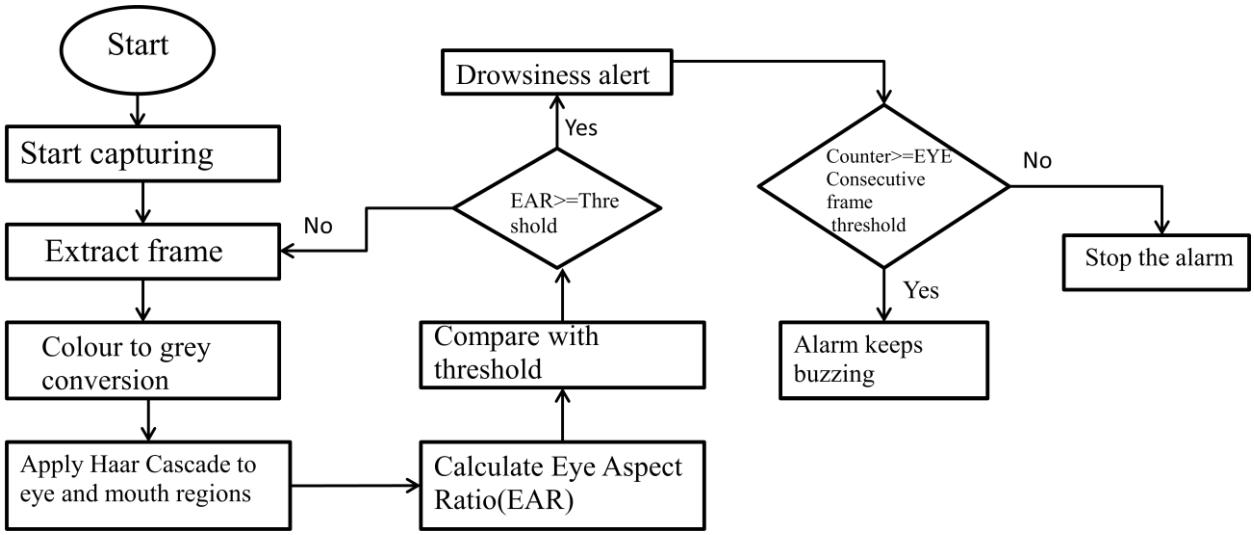

Fig 1 Flowchart of drowsiness detection system

The faster sleepiness detection and data processing are given top priority in the suggested system. It is kept track of and then counted how many frames are spent with the eyes closed. A warning message indicating that drowsiness has been detected is actually generated on the screen if the count is greater than a threshold value. Regardless of the driver's skin tone, complexion, or eyeglasses, the systemneedto be able to identify tiredness. By selecting the system that uses the proper classifiers in OpenCV for eye closure detection, all of these goals have been successfully met.

In this technique, the camera initially captures the image of the driver for processing. The driver's image is initially subjected to face detection in OpenCV, which is then followed by eye and mouth detection. The computer then determines the criteria for drowsiness detection by counting the number of open eyes in each frame. The driver is considered to be drowsy if the conditions are met. The system performs activities to remedy the driver's inappropriate conduct through the display and buzzer. The face and eye classifiers are necessary for this system. Different classifiers for the detection of faces and eyes are included in the HARR Classifier Cascade files that come with OpenCV.
The face is searched for and found in each frame using the built-in OpenCV xml "haarcascade frontalface alt2.xml." When a face is discovered, the classifier "haarcascade eye tree eyeglasses.xml" is used to identify open eyes and mouth.

PSEUDO CODE

Step 1: Image from camera
Step 2: Extract frames and covert to grey image.
Step 3: Face detection.
Step 4: Extract the Eye and mouth regions.
Step 5:Calculate EAR(eye aspect ratio) and distance between upper and lower lips.
Step 6: Detect Drowsiness by comparing calculated values with threshold values.
Step 7: If conditions for drowsiness are met then beep alarm.
Step 8: End.

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IV. RESULT AND DISCUSSION

Fig.2 Detection of eyes closed

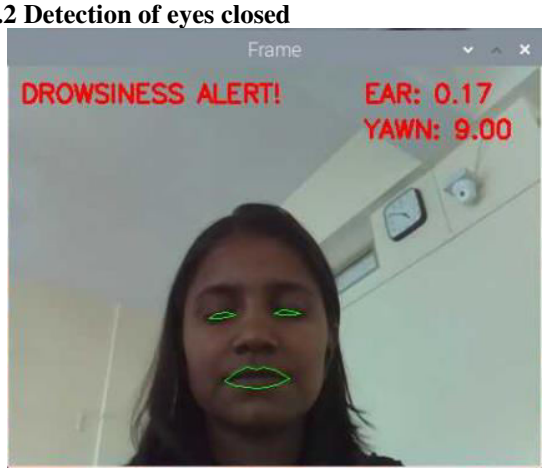


Fig.3 Yawning detection

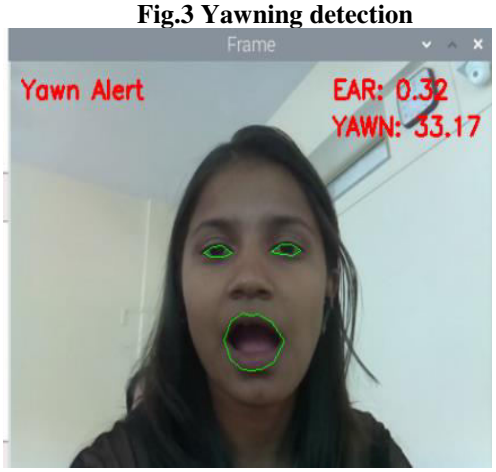
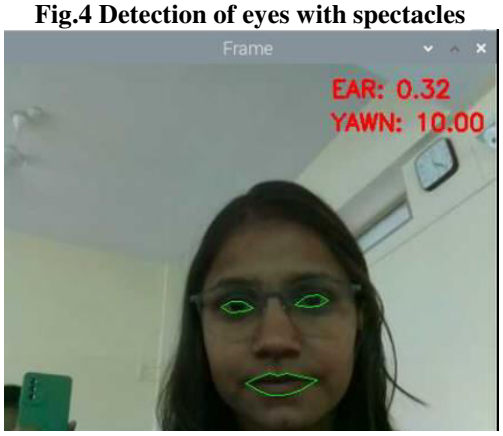


Fig.4 Detection of eyes with spectacles



When the driver's eyes are closed for 30 frames or longer(i.e., more than 5 seconds), the suggested drowsiness detection system determines their tiredness. The detection technology can tell the difference between a normal eye blink and being sleepy. The technology may be readily installed in any car and is not invasive. For 30 frames in a row, the driver's eyes were kept closed. Despite the driver wearing glasses, the technology is still able to identify tiredness. Fig. 4 depicts the condition of the driver using glasses. The wide eyes are noticed under typical driving circumstances. When the eyelids have been closed for 30 consecutive frames, as seen in Fig 2 drowsiness can be shown.Fig 3 shows the drowsiness detection if the mouth is open for 20 consecutive frames.

V. CONCLUSION AND FUTURE WORK

Drowsiness detection systems can be implemented using a variety of techniques. Since it provides more accurate readings and is dependable in terms of identifying the eye and face, the suggested work demonstrates that raspberry pi and open CV are more suitable for applications. On a live webcam, the procedures are carried out.By doing this, an immediate warning is delivered before any accident impacts, giving individuals ample time to take the appropriate actions and be safe.

In future the application can be extended by adding High Resolution Camera to detect face even in dim light conditions, it can also incorporate Alcohol Detection.

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